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Original Article

Psychometric Evaluation of Hill-Bone Medication Adherence Subscale

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SUMMARY

Purpose: Medication adherence is an essential part of the management and control of high blood pressure (HBP). Although the Hill-Bone Medication Adherence (HBMA) scale is one of the most frequently used instruments for measuring HBP medication adherence, the psychometric properties of the scale have never been tested among Korean Americans, a population that experiences a disproportionately high prevalence of HBP. Therefore, the objective of this study is to validate a Korean version of the HBMA subscale (HBMA-K).

Method: We used two, independent samples of Korean Americans (KAs) (combined $n = 525$) who participated in community-based intervention trials for HBP control. To develop the HBMA-K, the original scale was translated into Korean and then back translated into English. Reliability was assessed by calculating the Cronbach's alpha. Exploratory factor analysis (EFA) was done to assess construct validity. We also calculated the Pearson's correlation coefficients between the scale and theoretically driven variables such as blood pressure, knowledge, and HBP belief to test concurrent validity.

Results: The EFA revealed a one-factor solution with eight items, explaining 35.4% of the variance. Cronbach's alpha was .80. The 8-item HBMA-K scale was significantly associated with systolic blood pressure (BP) ($r = .18$, $p < .01$), diastolic BP ($r = .24$, $p < .01$), HBP knowledge ($r = -.13$, $p < .01$), and HBP belief score ($r = -.18$, $p < .05$).

Conclusions: The 8-item HBMA-K scale is a valid and reliable instrument for measuring medication adherence among KAs with HBP. It can be easily administered at community and clinical settings to screen hypertensive patients with low medication adherence.

Introduction

Despite overwhelming evidence for the effectiveness of pharmacological interventions in reducing high blood pressure (HBP) and relevant cardiovascular disease (CVD) risk factors (Dragomir et al., 2010; Taira et al., 2007), many hypertensive patients report difficulty adhering to their recommended antihypertensive medication regimen. Poor adherence to antihypertensive regimens results in poor clinical outcomes, as well as increased hospitalizations and health care costs (Dragomir et al.; Sokol, McGuigan, Verbrugge, & Epstein, 2005), with reports estimating that poor medication adherence accounts for as much as $300 billion in unnecessary health care expenses each year (Vlasnik, Aliotta, & Delor, 2005).

Available epidemiological studies indicate that Korean Americans (KAs) have a higher prevalence of HBP compared to the general population in the United States (32% *vs.* 29.6%), as well as their counterparts in Korea (21.8% of men, 19.4% of women) (Kearney, Whelton, Reynolds, Whelton, & He, 2004; M. T. Kim, K. B. Kim, Juon, & Hill, 2000; Ong, Cheung, Man, Lau, & Lam, 2007). Previous studies have reported poor medication adherence among KAs notwithstanding their high prevalence of HBP. In particular, approximately 60% of KAs with HBP report that they are not adherent to their medication regimen (E. Y. Kim et al., 2007; M. T. Kim, Juon, Hill, Post, & Kim, 2001; M. T. Kim, Kim, et al., 2000). Language barriers, cultural differences, less accessibility to the US health care system and lack of health insurance partly explains the low medication adherence rates among KAs. Additionally, poor HBP knowledge and incongruent health beliefs are associated with

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lower medication adherence among a range of populations (Doggrell, 2010; Gohar, Greenfield, Beevers, Lip, & Jolly, 2008; Kettani et al., 2009; E. Y. Kim et al., 2007; M. T. Kim et al., 2008; Krousel-Wood, Muntner, Jannu, Desalvo, & Re, 2005; Morisky, Ang, Krousel-Wood, & Ward, 2008; Ross, Walker, & MacLeod, 2004; Vlasnik et al., 2005). These factors undoubtedly also affect KAs, and cumulatively contribute to the higher rates of uncontrolled HBP in this population (M. T. Kim, Kim, et al., 2000).

Several medication adherence scales such as the Hill-Bone Scale, Morisky Medication Adherence Scale, and Brief Medication Questionnaire have been used in the literature. The Hill-Bone Scale (M. T. Kim, Hill, Bone, & Levine, 2000) is one of the most broadly used adherence scales. It is a 14-item scale that has been validated in various settings and populations including African-Americans, Germans and Turkish (Karademir, Koseoglu, Vatansevor, & Akker, 2009; M. T. Kim, Hill, et al., 2000; Koschack, Marx, Schnakenberg, Kochen, & Himmel, 2009; Lambert et al., 2006). The Morisky Medication Adherence scale consists of 4 items with yes or no responses. The low number of items on the scale often translates into total scores with a skewed distribution and low reliability, resulting in serious limitations (Morisky et al., 2008). The Brief Medication Questionnaire (Svarstad, Chewning, Sleath, & Claesson, 1999) has nine items with three subscales:the regimen screen, belief screen, and recall screen, which are used according to the reported type of medication nonadherence (repeat *vs*. sporadic nonadherence). While the Brief Medication Questionnaire appears to be a useful clinical tool because it focuses on identifying specific medication barriers, evidence supporting the validity of this tool is not sound. The original validation study only used 20 participants, precluding the ability to adequately assess the psychometric properties of the tool. Additionally, neither the Brief Medication Questionnaire nor the Morisky Scale has been adequately validated in the KA population.

In light of these considerations, the purpose of this study was to assess the validity and reliability of the Korean version of Hill-Bone Medication Adherence scale (HBMA-K). Once the reliability and validity of the HBMA-K is established, it will then be suitable for use among hypertensive KAs in both the clinical and community settings to assess medication adherence. Ultimately, we hope this assessment tool will aid in the reduction of cardiovascular health disparities that currently exists among KAs.

Methods

Study design and sample

Data for this analysis were taken from two community-based HBP intervention trials that targeted KAs in the Baltimore-Washington Metropolitan area. The first study, from here on referred to as Study 1, entitled "Self-help Intervention Program for HBP care (SHIP-HBP)" was conducted with middle-aged KAs ($N = 445$). The enrollment period for Study 1 was conducted from October 2003 to December 2004. Eligibility criteria included: (a) self-identification as a first-generation KAs, (b) 40–64 years of age, and (c) systolic BP (SBP) $\geq$ 140 and/or diastolic BP (DBP) $\geq$90 mm Hg or taking BP medication. Study brochures and flyers were distributed at ethnic churches, grocery stores, and social clubs in the KA community. Additionally, intensive media campaigns announcing the project were made through ethnic newspapers, weekly magazines, and several ethnic radio stations. Detailed procedures regarding the outreach and recruitment have been published elsewhere (Han et al., 2007). In this analysis, we included data from 185 KAs (range: 40–64 yr, $M \pm SD$: 52.5 $\pm$ 5.42 yr) who completed the HBMA-K questionnaire.

The second study, from here on referred to as Study 2, came from a prospective intervention trial for HBP control designed to test the effects of a health literacy-focused behavioral intervention with hypertensive KA immigrants over 60 years of age ($N = 440$). The enrollment period for Study 2 was conducted from January 2008 to May 2009. Inclusion criteria were as follows: (a) being able to read and speak Korean, (b) being on antihypertensive medication, and (c) having no cognitive impairment, screened through the Mini-Mental State Examination. Participants were recruited from ethnic churches in the target region with intensive outreach efforts during weekends. For this analysis, data from 340 elderly KAs (range: 60–89 yr, $M \pm SD$: 70.88 $\pm$ 5.39 yr) were used. Together, a combined total of 525 KAs with HBP were included in the analysis

Procedures

To conduct the instrument validation study, the HBMA-K scale was translated into Korean by bilingual researchers, then back translated by other bilingual researchers and finally cross-checked by all translators. There were no reported problems in understanding the scale, nor was cultural rewording necessary. Data on demographic and psychological variables, as well as antihypertensive medication usage were all obtained via participant self-report using a face-to-face interview method conducted by trained bilingual research staff. During the baseline evaluation for Study 1 and Study 2, the trained bilingual research staff also measured BP. Additionally, trained bilingual research staff, some of whom were nurses, were available at all recruitment events held in the community to ensure completeness of the surveys and to answer any questions that participants had. Surveys were conducted using a structured data collection questionnaire. The Johns Hopkins University Institutional Review Board approved all the study procedures and all the participants provided written informed consent prior to the interview.

Measurements

The study questionnaire included questions about demographic characteristics (gender, age, years of education, marital status, and working status). Additionally, medical history (duration of HBP, comorbidity, primary care provider [PCP] usage, health insurance status, years of HBP treatment, and BP) was collected.

Blood pressure

Participants' BP was measured by a trained research staff using the A&D UA-767 (A&D Company, Ltd, Tokyo, Japan). This device has been validated against a mercury sphygmomanometer. Participants were seated quietly for at least 5 minutes in a chair, with their feet on the floor and arms supported at heart level. Caffeine intake, exercise, and smoking were avoided for at least 30 minutes prior to the measurement. An appropriately-sized cuff was used and measurements were averaged using the second and third BP readings, recorded in mmHg. In accordance with the definition used in the seventh report of the Joint National Committee on the Prevention, Detection, and Treatment and Control of High Blood Pressure, BP control was defined as BP $<$ 140/90 mmHg ($<$130/80 mmHg for patients with diabetes) (National Heart, Lung and Blood Institute [NHLBI], 2004).

Korean version of the HBMA subscale (HBMA-K)

The original Hill-Bone scale consists of 14 four-point Likert-type items (1 = *none of time*, 2 = *some of the time*, 3 = *most of time*, and 4 = *all the time*) with three underlying domains: medication taking, appointment keeping, and salt intake. While the medication subscale has been proven to be significantly associated with blood pressure control, the other subscales have shown consistently low validity and internal reliability in previous studies (Karademir et al., 2009; Krousel-Wood et al., 2005; Lambert et al., 2006). In the

present study, we focused on the medication adherence subscale for KAs with HBP. For this purpose, we selected the 9-item medication taking subscale and translated them into Korean. The total scores on this subscale range from 9 to 36 with higher scores reflecting poorer adherence to antihypertensive drug therapy.

Knowledge and belief related to HBP management

HBP knowledge was assessed using a 26-item test (E. Y. Kim et al., 2007; Lee et al., 2010). Potential scores on the HBP knowledge test range from 0 to 26, with higher scores indicating greater HBP knowledge. E. Y. Kim et al. reported that the scores on the HBP knowledge test had a significantly negative correlation with medication adherence. The internal consistency of the HBP knowledge items, measured by Kuder-Richardson (KR)-20 coefficient, was .77, based on a previous study (Lee et al., 2010). The KR-20 coefficient for this study was .61 for the combined samples.

Beliefs about HBP were measured by a Hypertension Belief Scale (Bloomfield, Young, & Graves, 1993). It assesses how important individuals perceived HBP management to be for their health, with particular regards to smoking, stress, weight, alcohol, salt, antihypertensive regimens, coffee, diet, cholesterol, overwork and exercise. The HBP belief scale was translated into Korean, and used on middle-aged KAs with HBP (M. T. Kim et al., 2008; Lee et al., 2010). The scale consists of 11 items, assessed on a 4-point Likert scale, ranging from 1, which indicated *not at all* to 4, which indicated *very important*. Possible scores range from 11 to 44, with higher scores representing higher levels of positive HBP beliefs. In a study by M. T. Kim et al. (2008), scores on this scale were positively correlated with BP control, and demonstrated a Cronbach's alpha of .89. The Cronbach's alpha for this study was .76.

Data analysis

Psychometric testing was conducted in three steps. The first step involved assessing the frequency and distribution of each item on the scale. Participants' demographic characteristics as well as individual items on the HBMA-K scale were summarized using descriptive statistics. The next step consisted of assessing the internal consistency reliability, corrected item-total correlation, and inter-item correlation. Specifically, the internal consistency of the HBMA-K scale was assessed using the Cronbach's alpha . Item analysis was then performed to see if any items showed inter-item correlations below or above the desired criteria (>.30 or <.70) across the entire sample (Nunnally & Bernstein, 1994). Item-total correlations were determined after item correction, with the desired criteria set at >.30 (Nunnally & Bernstein). Finally, exploratory factor analysis (EFA) as well as testing theoretically driven hypothesis were used to test construct validity. In EFA, the initial factor selection was based on both empirical criterion (Eigen value > 1 tenant) and theoretical guidance (interpretability of the factors). Concurrent validity indicates the extent to which a score on a scale is correlated with some criterion measure (Waltz, Strickland, & Lenz, 2010). Based on the existing literature (Lee et al., 2010; Martin, Prayor-Patterson, Kratt, Kim, & Person, 2007), the present study assessed how well theoretically related variables for chronic disease management (i.e., BP, HBP knowledge and belief in HBP management) were correlated with medication adherence. To further support the testing of these relationships, the Hill-Bone adherence scale has been associated with clinical outcomes, such as BP, in other translated versions (M. T. Kim, Kim, et al., 2000; Lambert et al., 2006). All analyses were completed using SPSS statistical software program (SPSS Inc., Chicago, IL, USA) and carried out at a significance level of .05.

Table 1
Demographic Characteristics of Each Study.

Characteristics	Total ($N = 525$)	Study 1 ($n = 155$)	Study 2 ($n = 370$)
Frequency (%)			
Female	349 (66.5)	88 (56.8)	261 (70.5)
Married	362 (69.0)	144 (92.9)	218 (58.9)
Employed full or part-time	373 (71.0)	125 (80.6)	248 (67.0)
Health insurance	373 (71.0)	63 (40.6)	310 (83.8)
Comorbidity[a]	230 (43.8)	49 (31.6)	181 (48.9)
Having PCP	476 (90.7)	128 (82.6)	338 (94.1)
Controlled BP[b]	227 (43.2)	64 (41.3)	163 (44.1)
M (*SD*)			
Age, yr	65.5 (10.0)	52.54 (5.4)	70.88 (5.4)
Education, yr	11.83 (4.1)	13.52 (2.6)	11.12 (4.4)
Duration of having HBP, yr	9.34 (8.4)	5.78 (6.1)	10.94 (8.8)

Note. BP = blood pressure; HBP = high blood pressure; PCP = primary care provider.
[a] Comorbidity includes diabetes, coronary heart failure, kidney disease and angina pectoris; [b] Controlled BP: Defined as BP < 140/90 mmHg (130/85 mmHg for patients with diabetes).

Results

Sample characteristics

Given that the overall sample of KA hypertensive participants came from two studies designed for different study aims, the demographic characteristics of the two studies varied slightly. As such, they are presented separately to highlight the added representativeness that is gained from combining the two samples. The demographic characteristics of the combined sample ($N = 525$) are also presented in Table 1. The combined data set was used to assess the validity and reliability of the HBMA-K scale.

Participants from Study 1 were younger (52.5 ± 5.4 yr *vs.* 70.9 ± 5.4 yr) and more educated (13.5 ± 2.6 yr *vs*. 11.1 ± 4.4 yr), but less likely to have health insurance compared to those from Study 2. BP control rates were 41.3% and 44.1% for Studies 1 and 2, respectively.

The number of participants reporting medication adherence (i.e., those who answered *none of the time* for all 9 items) in Studies

Table 2
Proportion of Participants Who Responded *None of the Time* to HBMA-K Scale.

Items[a]	Frequency (%)		
How often do you…	Total ($N = 525$)	Study 1 ($n = 155$)	Study 2 ($n = 370$)
1. Forget to take your hypertension medicine?	337 (64.2)	89 (57.4)	248 (67.0)
2. Decide not to take your hypertension medicine?	425 (81.0)	108 (69.7)	317 (85.7)
3. Forget to get prescriptions filled?	482 (91.8)	133 (85.8)	349 (94.3)
4. Run out of hypertension pills?	453 (86.3)	119 (76.8)	334 (90.3)
5. Skip your hypertension medicine before you go to the doctor?	431 (82.1)	118 (76.1)	313 (84.6)
6. Miss taking your hypertension pills when you feel better?	440 (83.8)	110 (71.0)	330 (89.2)
7. Miss taking your hypertension pills when you feel sick?	475 (90.5)	127 (81.9)	348 (94.1)
8. Take someone else's hypertension pills?	512 (97.5)	148 (95.5)	364 (98.4)
9. Miss taking your hypertension pills when you are careless?	338 (64.4)	88 (56.8)	250 (67.6)
No. of adherence[b]	229 (43.6)	61 (39.4)	168 (45.4)

Note. HBMA-K = Hill-Bone Medication Adherence Korean version.
[a] Each item can be answered on a 4-point Likert-scale (1 = *none of the time*, 2 = *some of the time*, 3 = *most of the time*, and 4 = *all the time*); [b] Number of participants who answered *none of the time* for all 9 items.

Table 3
Factor Analysis and Corrected Item Total Correlation.

Items	Model l	Model 2
How often do you…	Factor 1	Factor 1
Eigen value	2.81	2.83
Percantage of variance	31.26	35.39
1. Forget to take your hypertension medicine?	0.64	0.60
2. Decide not to take your hypertension medicine?	0.48	0.50
3. Forget to get prescriptions filled?	0.57	0.59
4. Run out of hypertension pills?	0.64	0.62
5. Skip your hypertension medicine before you go to the doctor?	0.40	0.42
6. Miss taking your hypertension pills when you feel better?	0.70	0.73
7. Miss taking your hypertension pills when you feel sick?	0.63	0.66
8. Take someone else's hypertension pills?	0.10	–
9 Miss taking your hypertension pills when you are careless?	0.62	0.60
Cronbach's alpha	.77	.80
Range of corrected item-total correlation	.09–.61	.37–.63

1 and 2 were 39.4% and 45.4%, respectively (Table 2). The item, "How often do you take someone else's hypertensive pills" had the highest proportion of respondents who answered *none of time* (97.5%). The item, "How often do you miss taking your hypertensive pills when you are careless" had the lowest proportion of respondents who answered *none of time* (56.8%) in Study 1. In Study 2, the item "How often do you forget to take medicine" had the lowest proportion of respondents who answered *none of time* (67.0%).

Construct validity

EFA revealed that a one-factor solution was the best way to characterize the data. The factor loadings on eight of the nine items were all above .40, and corresponded to a single latent factor named "medication adherence". The one item that did not load onto that factor was, "How often do you take someone else's hypertension pills?" It revealed a relatively weak loading of .10. Using the eight items, the one-factor solution explained 35.4% of the variance in medication adherence (Table 3).

Concurrent validity

We analyzed the correlations between HBP knowledge, HBP belief and BP outcomes with the 8-item HBMA-K scale to assess concurrent validity (Table 4). While recalling that higher HBMA-K scores represent lower medication adherence, the mean HBMA-K score showed a significant positive correlation with SBP and DBP, and negative correlation with knowledge and HBP belief score in the combined sample.

Internal consistency

Cronbach's alpha of the HBMA-K scale with nine items was .77 (Table 3). The corrected item-total correlation of the item "How often do you take someone else's hypertension pills?" was .09. The consistently low performance of this item points to potential measurement error that could be due to a possible "social desirability bias" in that people may not want to report talking someone else's medication. In Model 2 this item was deleted and the recalculated Cronbach's alpha improved to .80 (Table 3). This confirmed our initial suspicion about the significant inclusion of measurement error in that item. The corrected item-total correlations in Model 2 ranged from .37 to .63.

Table 4
Correlation Between HBMA-K and Theoretically Related Variables.

Variables	Systolic BP	Diastolic BP	HBP knowledge	HBP belief
HBMA-K[a]	$r = .18$*	$r = .24$*	$r = -.13$*	$r = -.18$*

Note. BP = blood pressure; HBP = high blood pressure; HBMA-K = Hill-Bone Medication Adherence Korean version.
[a] The higher HBMA-K score, the lower adherence to medication taking; HBMA-K is modified model with 8 items.
*$p < .01$.

Discussion

The psychometric assessment and its findings in this study support the validity and reliability of an 8-item HBMA-K scale. We found that scores on the HBMA-K with eight items were predictive of BP outcomes and were significantly correlated with other theoretically selected variables. The findings are consistent with those of previous studies (Karademir et al., 2009; M. T. Kim, Hill, et al., 2000; Krousel-Wood et al., 2005; Lambert et al., 2006).

The reliability of the 8-item HBMA-K scale was also acceptable (Cronbach's alpha = .80). Validation studies of the Hill-Bone scale in other languages have revealed comparable reliability coefficients (Karademir et al., 2009; Koschack et al., 2009; Lambert et al., 2006). For example, Karademir et al. reported that the Turkish version of the Hill-Bone scale with nine items had a Cronbach's alpha of .72. Similarly, Lambert et al. also published a South African version of the scale with a Cronbach's alpha of .77.

The result of our EFA, which yielded a one-factor model, is also consistent with previous validation studies that looked specifically at the medication subscale of the Hill-Bone scale (M. T. Kim, Hill, et al., 2000; Krousel-Wood et al., 2005). The proportion of variance explained by the one-factor solution was higher among the middle-aged KA sample than the senior KA sample. This finding implies that the HBMA-K may be a better predictor of medication adherence among middle-aged KAs rather than older KAs.

In our study, one item did not perform well, "How often do you take someone else's hypertension pill?" The low performance of this item may potentially be related to a "social desirability bias". While some of our previous data (E. Y. Kim et al., 2007; M. T. Kim et al., 2001) suggests that "sharing BP medications with others is a relatively common practice," many participants also know that it is not "socially desirable," to report doing so to health care providers. That item was also identified as questionable in previous studies with other racial and ethnic groups (Karademir et al., 2009; Koschack et al., 2009; Krousel-Wood et al., 2005; Lambert et al., 2006).

In this study, we did not include the problematic item in the final model. However, careful consideration of the item with regard to its importance and how its delivery may or may not create error should be given before an item is discarded. *Dong Byung Sang Lyun*—if someone has the same disease as another person, they feel sympathy for each other—is a commonly shared cultural theme among KAs that affect their health practices. This cultural attitude may result in unsafe health behaviors such as sharing medications or pills. It is critical to investigate whether individuals are "sharing" medication so that we can develop individualized interventions based on their health beliefs, as well as help categorize medication adherence risk behavior (i.e., intentional *vs*. nonintentional nonadherence).

One strategy to approach this kind of sensitive question, while maximizing the probability of an authentic response, is to assure participants that this practice is often observed among their peers. This may help them feel that they are not being critically judged based on their behavior. For example, studies wishing to identify illicit drug use on certain populations often start questions with the

following introductory phrase: "In our community, many people often use illicit drugs. We were wondering how many times you have used an illicit drug over the last week?" The addition of a simple introductory phrase has been shown to reduce social desirability bias and improve the authenticity of responses significantly (M. T. Kim & Hill, 2003). However, since an introductory phrase was not used on our problematic item, the potential measurement error that ensued precluded our ability to justify its inclusion into the final scale. Additional testing of this important item with improved strategy is necessary in addressing potential cultural norms or behaviors that may affect their medication taking behavior in the KA community .

This study has some limitations. First, patient adherence to medication was self-reported. Although adherence to HBP medication can be assessed using various methods such as medication event monitoring systems, drug level measurement in the body, or refill compliance calculations from claims data (Kripalani, Risser, Gatti, & Jacobson, 2009), patient's self-report has been recommended as one of the most practical and cost effective methods especially for ethnic minorities such as KAs (Osterberg & Blaschke, 2005). Second, two independent data sets were used in this study to create a larger sample size to test the validity and reliability of the instrument. While larger sample sizes offer better opportunities to test the instruments, the data set might inadvertently include potential bias that influence the distribution of certain items on the scale. For example, the two samples have different distributions of demographic factors such as "access to care and medication", which may be due to age-based medical entitlement programs in the US. This in turn may decrease the variability in responses to items within each sample. Third, a relatively weak correlation between the HBMA-K scale and BP outcomes calls for additional evaluation as well as innovative strategies to improve the clinical utility of the instrument. Nevertheless, the weak correlation may speak to the multidimensional nature of the construct. Additional conceptual analysis is warranted to capture the unique underlying medication taking behavior of different cultural groups to elucidate this complex phenomenon. Fourth, the HBMA-K scale does not provide a cutoff point as compared to the Morisky scale (Morisky et al., 2008). Systematically identifying a cutoff point for the HBMA-K scale may help predict clinical outcomes such as BP, for which additional research is warranted. Lastly, according to the Joint National Committee (JNC) VII guidelines, several evidence-based recommendations for the control of HBP were made, including reducing weight, adopting a dietary approach to stop hypertension, reducing dietary sodium intake, engaging in physical activities, moderating alcohol intake and adhering to medication (NHLBI, 2004). The present study only focuses on validating one aspect of BP control among KA populations. Further studies are needed to develop and test measurement tools that can capture the multidimensional behaviors related to BP control. The 8-item HBMA-K scale can serve as a useful starting point for developing such a tool.

Conclusion

The prevalence and control of HBP differ across racial and ethnic groups in the US population (NHLBI, 2004). For KAs, an emerging ethnic minority group, health disparity in the prevalence and control of hypertension has been well documented (Han et al., 2007; E. Y. Kim et al., 2007). The present study provides empirical support for an evaluation tool that assesses antihypertensive medication adherence, a key factor that must be addressed for successful control of HBP, in this high-risk population. Health care providers and researchers can use the information to better understand their patients' degree of medication adherence, and then establish tailored strategies for improving adherence in KAs populations with HBP.

Conflict of interest

There are no conflicts of interest.

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